

CLAIMS

1. A chromoprotein derived from *Cnidopus japonicus* having the following properties:

- (1) the absorption maximum wavelength is 610 nm, and fluorescence is not emitted;
- (2) the molar absorption coefficient is 66,700 at 610 nm; and
- (3) the pH sensitivity of light-absorbing property is stable at between pH 4 and pH 10.

2. A chromoprotein having either one of the following amino acid sequences:

- (a) the amino acid sequence shown in SEQ ID NO: 1; and
- (b) an amino acid sequence comprising a deletion, substitution and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 1, and having light-absorbing properties.

3. A chromoprotein capable of emitting fluorescence, which has an amino acid sequence, wherein, with respect to the amino acid sequence shown in SEQ ID NO: 1, alanine as an amino acid residue at position 28 is substituted by glycine, glutamic acid as an amino acid residue at position 41 is substituted by methionine, cysteine as an amino acid residue at position 145 is substituted by serine, and threonine as an amino acid residue at position 158 is substituted by isoleucine.

4. A chromoprotein having an amino acid sequence wherein tyrosine as an amino acid residue at position 64 is substituted by leucine with respect to the amino acid sequence shown in SEQ ID NO: 1.

5. A chromoprotein having an amino acid sequence wherein tyrosine as an amino acid residue at position 64 is substituted by methionine with respect to the amino acid sequence shown in SEQ ID NO: 1.

6. A chromoprotein having an amino acid sequence, wherein glutamic acid as an amino acid residue at position 41 is substituted by leucine, and phenylalanine as an

amino acid residue at position 80 is substituted by glycine, with respect to the amino acid sequence shown in SEQ ID NO: 1.

7. A chromoprotein capable of emitting fluorescence, which has an amino acid sequence wherein tyrosine as an amino acid residue at position 64 is substituted by phenylalanine with respect to the amino acid sequence shown in SEQ ID NO: 1.

8. A chromoprotein capable of emitting fluorescence, which has an amino acid sequence wherein tyrosine as an amino acid residue at position 64 is substituted by histidine with respect to the amino acid sequence shown in SEQ ID NO: 1.

9. A chromoprotein capable of emitting fluorescence, which has an amino acid sequence, wherein cysteine as an amino acid residue at position 26 is substituted by valine, cysteine as an amino acid residue at position 143 is substituted by serine, and proline as an amino acid residue at position 199 is substituted by leucine, with respect to the amino acid sequence shown in SEQ ID NO: 1.

10. A DNA encoding the protein of any of claims 1 to 9.

11. A DNA of either one of followings:

(a) DNA encoding the amino acid sequence shown in SEQ ID NO: 1; and

(b) DNA encoding an amino acid sequence, which comprises a deletion, substitution and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 1, and has light-absorbing properties.

12. A DNA having either one of the following nucleotide sequences:

(a) the nucleotide sequence shown in SEQ ID NO: 2; and

(b) a nucleotide sequence comprising a deletion, substitution and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 2, and encoding a protein having light-absorbing properties.

13. A DNA having the nucleotide sequence shown in any one of SEQ ID NOS: 12, 14, 16, 18, 20, or 22.

14. A recombinant vector having the DNA of any of claims 10 to 13.

15. A transformant having the DNA of any of claims 10 to 13 or the recombinant vector of claim 14.

16. A fusion protein composed of the chromoprotein of any of claims 1 to 9 and another protein.

17. A method for analyzing a physiologically active substance, which is characterized in that the FRET (fluorescence resonance energy transfer) method is applied using the chromoprotein of any of claims 1 to 9 as an acceptor protein.

18. A light-absorbing reagent kit comprising the chromoprotein of any of claims 1 to 9, the DNA of any of claims 10 to 13, the recombinant vector of claim 14, the transformant of claim 15, or the fusion protein of claim 16.